TOWN OF WEST NEWBURY PLANNING BOARD
APPLICATION FOR SPECIAL PERMIT and/or SITE PLAN REVIEW

Application for: [ ] Special Permit [X] Site Plan Review [ ] Both

(Adopted December 21, 2011)

Please type or print clearly.

1. Applicant: Brad Dore, Principal, Dore + Whittier Architects

Applicant's Address: 260 Merrimac St. Building 7, 2nd Floor

Telephone Number: 978-499-2999

2. Owners of the Land: Pentucket Regional School District

Address: 22 Main St.

Telephone Number: 978-363-2280

Number of years of Ownership: 1

3. Year Lot was Created: 2020

4. Description of Proposed Project, including applicable section(s) of the Zoning Bylaw: Pentucket Regional School District is proposing a 50' x 100' steel maintenance building on the 0.958 acre lot on Farm Lane behind the new school. The building will be used to store vehicles and maintenance equipment. There will be a small paved parking area with its own stormwater system, small retaining walls, landscaping, lighting, etc.

5. Description of Premises: The existing 0.958 acre lot located on the southern side of Farm Lane is grassed and mostly open, with several large white pine trees and a wooded area located on the southeastern end of the lot. This parcel noted as "Parcel A" has been combined with the rest of the PRSD property where the new MS/HS project is currently being constructed. The larger PRSD site also contains the existing middle school and the existing high school and appurtenant facilities.

6. Address of Property Affected: 22 Farm Lane, Parcel A, West Newbury, MA 01985
Zoning District: Res B
Assessors: **Map:** R-1 **Lot #:** 4A
Registry of Deeds: **Book:** 38624 **Page:** 214
Plan Book and Plan Number 477/26

7. Existing Lot:
Lot Area (sq. ft.) 41,715 sf/ (2,265,120 sf) * **Building Height** N/A
Street Frontage 43.38' (1,672') * **Side Setbacks** N/A
Front Setback N/A **Rear Setback** N/A
* Parcel "A" / (combined lot(s) as recorded)

Floor Area Ratio N/A **Lot Coverage** N/A

8. Proposed Lot (if applicable):

Lot Area (sq. ft.)	41,715 sf. / (2,265,120 sf) *	**Building Height:**	30'+/-
Street Frontage	43.38' (1,672') *	**Side Setbacks**	30', 20'
Front Setback	118.8'	**Rear Setback**	214.4'
Floor Area Ratio	0.12	**Lot Coverage**	30%

* Parcel "A" / (combined lot(s) as recorded)

9. Required Lot (as required by Zoning Bylaw):

Lot Area (sq. ft.)	40,000	**Building Height**	35'
Street Frontage	200'	**Side Setbacks**	20'
Front Setback	40'	**Rear Setback**	20'
Floor Area Ratio	unknown	**Lot Coverage**	30%

10. Existing Building (if applicable):

Ground Floor (sq.ft.) _____ **# of Floors** _____
Total sq. ft. _____ **Height** _____
Use: _____ **Type of Construction** _____

11. Proposed Building:

Ground Floor (sq.ft.) 5000 **# of Floors** 1
Total sq. ft. 5000 **Height** 30'+/-
Use: Maintenance building **Type of Construction** steel

12. Has there been a previous application for a Special Permit or Site Plan Review from the Planning Board on these premises? Yes **If so, when, what type of construction, and the action made?**
2020, steel, was not approved

13. Applicant and Landowner signature(s):

Every Application for a Special Permit/Site Plan Review shall be made on this form which is the official form of the Planning Board. Every Application shall be filed with the Town Clerk's Office. It shall be the responsibility of the Applicant to furnish all supporting documentation with this application. The dated copy of this Application received by the Town Clerk or Planning Office does not absolve the Applicant from this responsibility. The Applicant shall be responsible for all expenses for filing and legal notification. Failure to comply with application requirements, as cited herein and in the Planning Board Regulations, may result in a dismissal by the Planning Board of this Application as incomplete.

Applicant's Signature: _____

Print or type name here:
C. BRADLEY DORE, PRINCIPAL

Date: SEPTEMBER 27, 2021

Owner's Signature: 

Print or type name here: Dr. Justin Bartholomew

Date: 27 September 2021

Town of West Newbury

09/23/2021

Data Sources: Produced by Merrimack Valley Planning Commission (MVPC) using data provided by the Town of West Newbury & MassIT/MassGIS.

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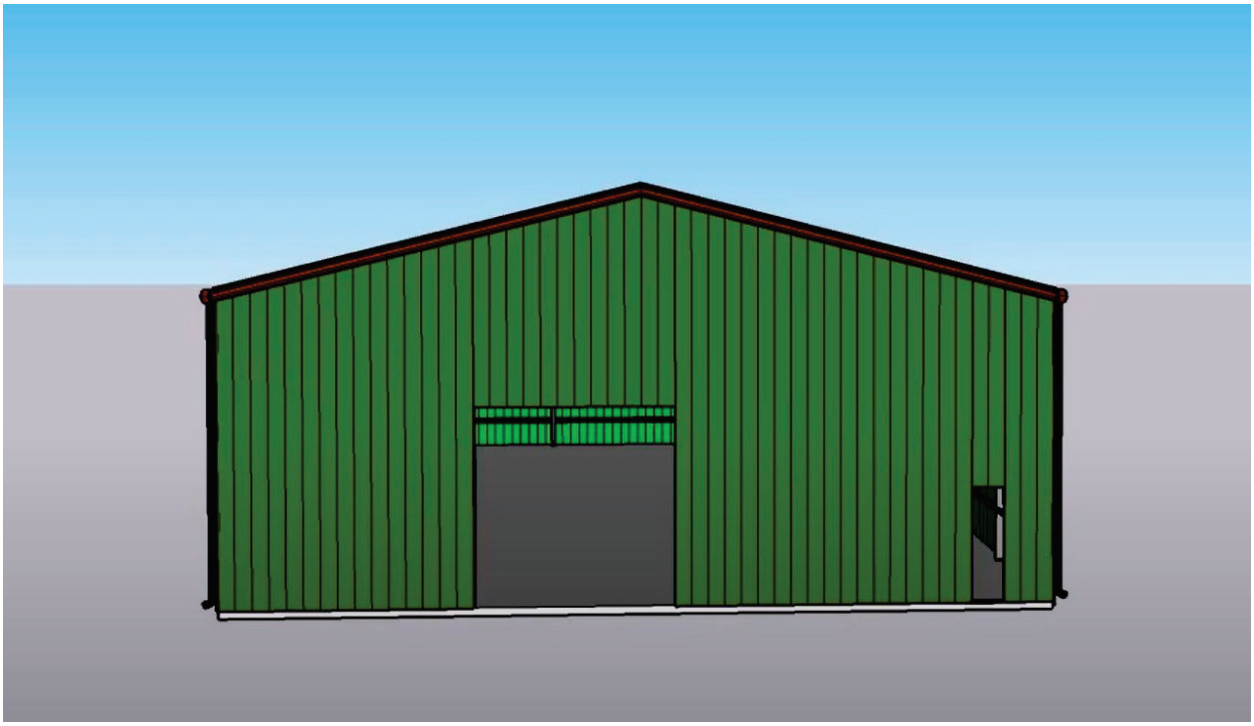
Legend

- MVPC Boundary
- Parcels
- Roads
- Interstate
- Major Road
- Local Road
- Building Footprints
- Trails
- Easements
- Hydrographic Features
- Streams
- Wetlands

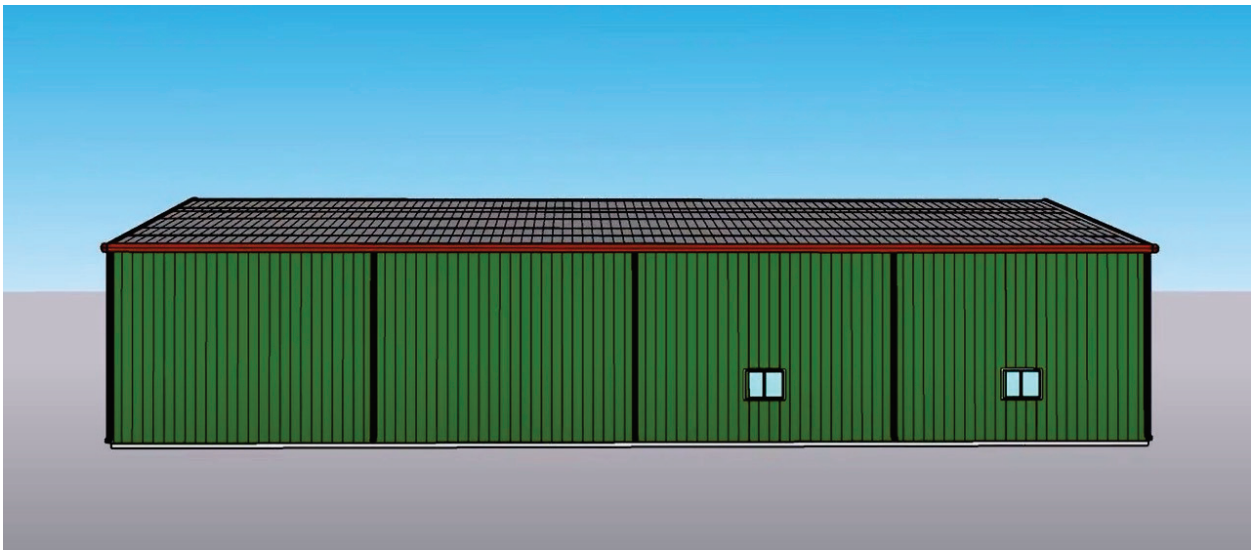
Aerial Photo

Projection: NAD_1983_StatePlane_Massachusetts_Mainland_FIPS_2001

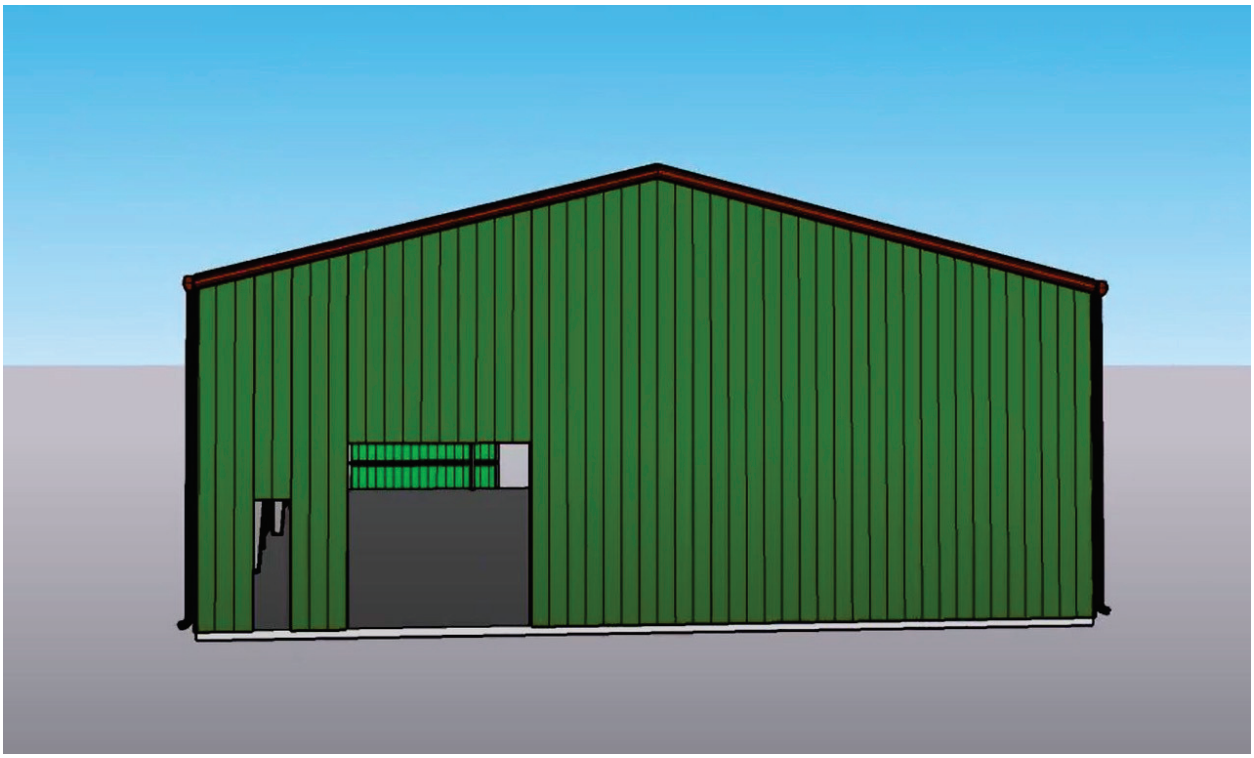
PROPOSED BUILDING ELEVATIONS



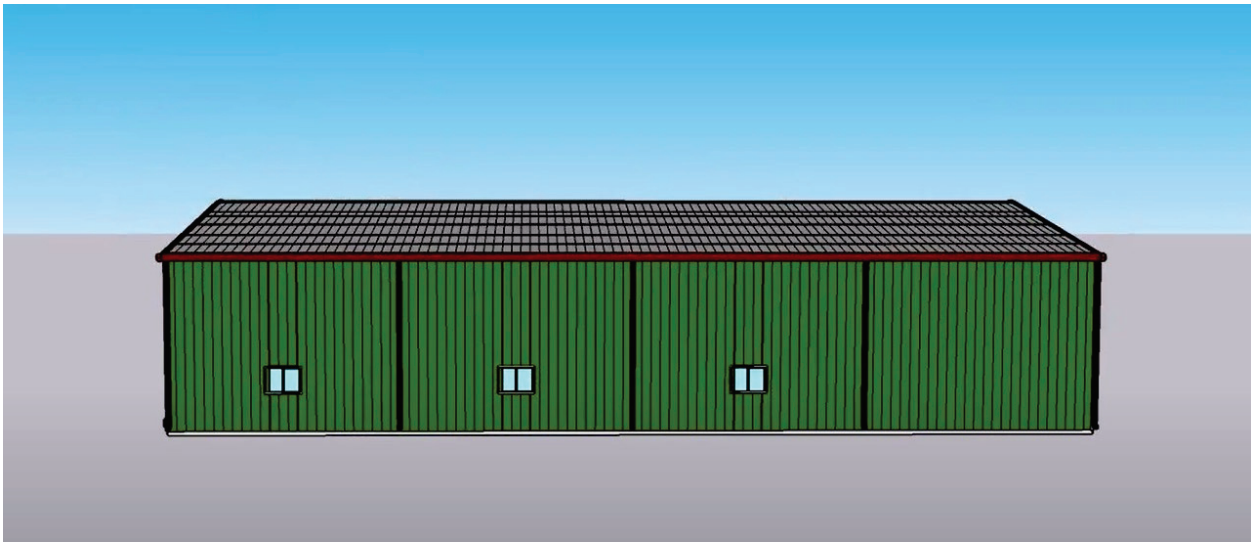
Front (northeast) elevation



Side (west) elevation



Back (southwest) elevation



Side (east) elevation

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ASH GRAY SR .47 SRI 55	SADDLE TAN SR .48 SRI 55	DESERT SAND SR .42 SRI 48	KOKO BROWN SR .28 SRI 29	CHARCOAL GRAY SR .27 SRI 27	COBALT BLUE SR .28 SRI 27	LIGHT STONE SR .50 SRI 58

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CLASSIC GREEN SR .27 SRI 27	BROWNSTONE SR .47 SRI 54	BRITE RED SR .49 SRI 56	HARBOR BLUE SR .28 SRI 27	

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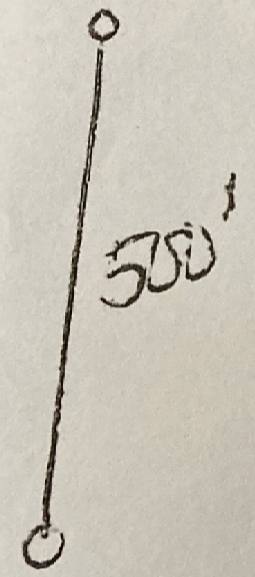
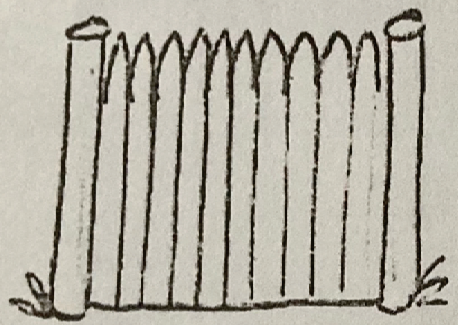
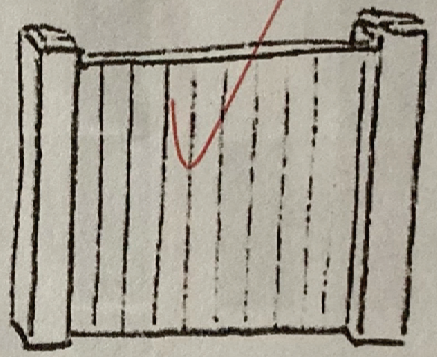
BARBARA'S CHOICE

OB DIAGRAM:

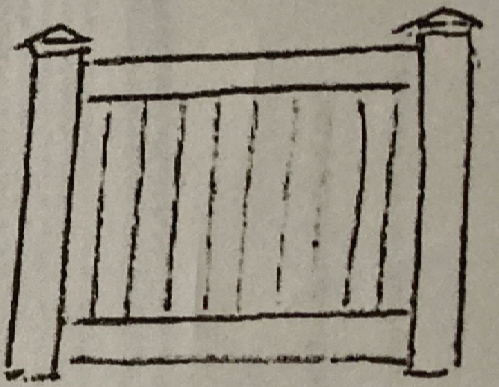




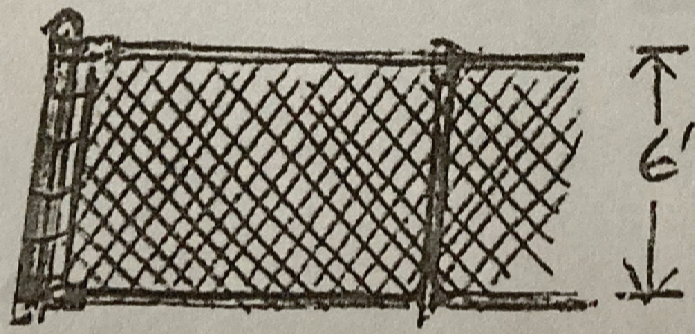
CEDAR STOCKADE



CEDAR BOARD



WHITE PVC



BLACK CHAINLINK
WITH BOTTOM-RAIL

Bergman & Associates, Inc.
Engineers

20 Washington Street
Haverhill, MA 01832-5524
Tel. (978) 372-1125

September 28, 2021

Reference: Pentucket School District – Maintenance Building

Erosion, Sedimentation, & Pollution Prevention Plan

Table of Contents

1. Project Information

Project: Pentucket School District – Maintenance Building

Project Type: New Construction

Project Function: Maintenance Building

Location: Farm Lane, West Newbury, MA 01985

Property Owner: Pentucket Regional School District

Owner Contact Info: (978) 363-2280

Applicant: Brad Dore, Dore + Whittier

Applicant Contact Info: (978) 499-2999

Engineering Firm: Bergman & Associates, Inc.

Engineering Firm Contact Info: (978) 372-1125

Engineer: Paul Bergman, PE

Person(s) Responsible for Implementation of Plan: Pentucket Regional School District

2. Site Description

Pentucket Regional School District has proposed a maintenance building for the 0.958 acre parcel off of Farm Lane, to the northwest of the new school building. The building will be metal, 50'x100', with garage doors on the 50' sides. The PRSD facilities team of approximately 5 employees will be using the building during normal school hours to store vehicles and maintain equipment. The front entry to the building will be paved with 5 parking spaces, including a handicap spot. The sides and back of the building will be a gravel area for vehicles to drive on. This gravel area will extend approximately 40' off the back of the building. The remaining portion of the lot will be grassed. There will be a stormwater management system of down conductors, a slotted drain, and detention pond to collect stormwater and manage runoff. Roof water will be piped to a cistern for future use on the site. A cedar board fence will run on the western property line to separate the site from the abutter. The building will have lighting on the side closest to the school. Electric service will come from the utility pole in the street, and water, sewer, and telephone will come from the school services.

3. Sequencing of Construction and Erosion Controls

1. Call Digsafe to mark any underground utilities.
2. Install temporary erosion control devices (straw wattles) per construction drawings.
3. Install stone construction entrance at the proposed entrance and exit.
4. Install proposed drainage and infiltration systems. Install temporary sedimentation protection devices in any other areas as conditions warrant.
5. Install proposed building.
6. Mulch, hydroseed, or otherwise protect slopes when soil is exposed.
7. Apply dust-control measures as weather conditions warrant.
8. Clean out stone filter site entrances as necessary. Sweep adjacent street as necessary.
9. Install utilities.
10. Install curb cuts.
11. Complete final site grading and install first layer of pavement.
12. Lay gravel.
13. Loam and seed where necessary.
14. Complete top layer of paving and striping.
15. Install lighting and signage of parking area.
16. Complete landscaping.
17. Remove sediment from drainage structures and temporary erosion controls after site has been completely stabilized.

4. Construction Period and Temporary Erosion and Sedimentation Control

Construction Period

Erosion and sedimentation controls will be provided for construction involving soil excavation. The details for these controls are shown in the construction drawings. The following ECP outlines the project's erosion control methods and provides guidelines for stabilization of disturbed soils utilizing various accepted techniques (best management practices).

- Minimize the amount of land disturbed and soil exposed during construction.
- Provide a flexible program for implementing erosion control measures that can be adapted to specific locations as determined by slope severity, soil textures, and site-specific experience.
- Provide stabilization of stockpiled soils. Provide seed to permanently stabilize areas of site where construction has been completed.
- Properly filter or settle out suspended solids from runoff before it leaves the site.
- Inspect stormwater management system weekly during construction. Remove and dispose of any sediment accumulation according to town regulations. After construction, provide a periodic (monthly after every storm > 0.5 inches rain) and monitoring and maintenance program to ensure erosion and sedimentation control devices are properly installed, maintained, and functioning.
- Trash and debris on site shall be stored in dumpsters and properly disposed of. The contractor shall organize dumpster emptying and training of personnel regarding the proper disposal procedure. Hazardous waste shall be disposed of according to local and/or state regulations.
- Provide dust control measures for the duration of construction. These measures include watering the road and planting vegetative cover over disturbed areas not subject to traffic.

Temporary

Straw Wattles

The construction drawings call for straw wattles to be installed around the perimeter of work area. Sediment shall be removed and disposed of as necessary. Disposal shall be according to local, state, and federal guidelines. Any compromised erosion control devices shall be replaced. The construction access ways to the site will be served by temporary stone filter construction entrances.

Encircle stockpiles scheduled to be in place seven (7) days during the dry season, or two (2) days during the wet season.

If any exposed area is not to be worked for seven (7) days during the dry season, or two (2) days during the wet season, cover and stabilize the area with temporary wood fiber mulch or equivalent.

Dewatering shall be performed using accepted BMPs and in a manner to prevent sediment from leaving the site. The dewatering process will include pumping or otherwise directing water into a temporary detention basin or other approved device. Water shall be allowed to leave said device only when it is deemed relatively free of sediment.

5. Inspection and Maintenance Procedures

1. Ensure siltation control devices are installed prior to commencing any construction activities. Straw wattles shall be anchored into the ground according to the construction drawing prior to the start of construction. Each wattle shall contain a bar driven deep enough into the ground to prevent movement. Bars shall be driven through the middle of the wattle leaving at least 2-3' of bar extending above the wattle. Sediment deposits shall be removed once they reach ½ the height of the wattle. Failure of any erosion control device shall require immediate repair or replacement. Contractor shall inspect devices according to inspection schedule below.
2. Inspect stormwater management system weekly during construction. Remove and dispose of any sediment accumulation according to city regulations. After construction, provide a periodic (monthly after every storm > 0.5 inches rain) and monitoring and maintenance program to ensure erosion and sedimentation control devices are properly installed, maintained, and functioning.
3. Inspect detention pond yearly, per Massachusetts Stormwater guidelines (attached).
4. Inspect pumps, Contech devices, etc., according to manufacturer's recommendations.

6. Inspection and Maintenance Schedule

Schedule for PSD Maintenance Bldg, Farm Lane, West Newbury, MA	
Item	**Inspection Frequency**
Straw wattles	Daily during prolonged rainfall
	After runoff producing rainfall or any rainfall event over 0.5"
	Weekly during dry spells
Item	**Maintenance Frequency**
Straw wattles	Once a device fails or is noticed to be in need of repair
	Once sediment deposits reach 1/2 the height of the structure

7. Pollution Prevention Plan

The following maintenance measures shall be performed by the Pentucket School District Maintenance Department to ensure the quality of stormwater runoff:

1. Slotted drain shall be inspected monthly or according to manufacturer's recommendations. Inspect and clean sediments and debris from bottom and inlets. Sediments shall be disposed of according to local, state, and federal guidelines. Any damage or malfunction shall be reported and repaired.

2. Drainage pipes shall be inspected every five years or as necessary and cleaned out as required to maintain proper function. Sediments shall be disposed of according to local, state, and federal guidelines.

3. Roof down conductors shall be inspected quarterly. Spouts and screens shall be kept clear of leaves, debris, etc. Any broken or leaking conductor shall be repaired and/or replaced. Roof shall be kept free of debris.

4. Pavement shall be inspected regularly and maintained. Any cracking shall be sealed and/or repaved as to not compromise drainage flow off the pavement. Sweep pavement quarterly and properly dispose of sweepings.

5. Gravel area shall be inspected quarterly. Gravel shall be raked to remove leaves, and other debris. Weeds shall also be removed. Low spots or holes shall be replaced with new stone as necessary.

6. Grassed areas shall be inspected quarterly and maintained. Mulch shall be replaced as needed.

7. Erosion control shall be inspected after every major storm event greater than 1" to ensure functionality. Sediment shall be removed and disposed of as necessary. Disposal shall be according to local, state, and federal guidelines. Any compromised erosion control devices shall be replaced.

The following are long term practices designed to be followed by the owner to prevent stormwater pollution:

- Pick up and remove any litter if noticed on the site.
- Inspect dumpsters and remove trash properly. Check dumpster areas for spills
- Proper snow removal and de-icing, salt and sand use shall be used as necessary
- Proper use and storage of fertilizers and pesticides

Erosion Control Inspection and Maintenance Log Form

Site Name: _____

Date/Time: _____

Inspector Name: _____

Weather Conditions: _____

Observations:	Yes	No	N/A
- Erosion controls in good condition	☐	☐	☐
- Sediment in area of construction	☐	☐	☐
- Erosion controls around stockpiles	☐	☐	☐
- Sediment tracking throughout site	☐	☐	☐

List any construction activities since the last site inspection.

_____

_____

List any activities that do not comply with the erosion control O&M plan.

_____

_____

List any other concerns/recommendations.

_____

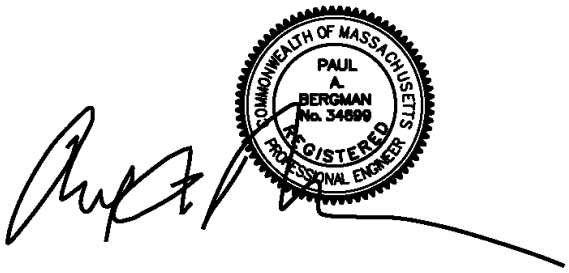
_____

To the best of my knowledge, based upon inspection of the site, construction is being performed in accordance with the erosion control operations and maintenance plan.

_____ _____

Signature Date

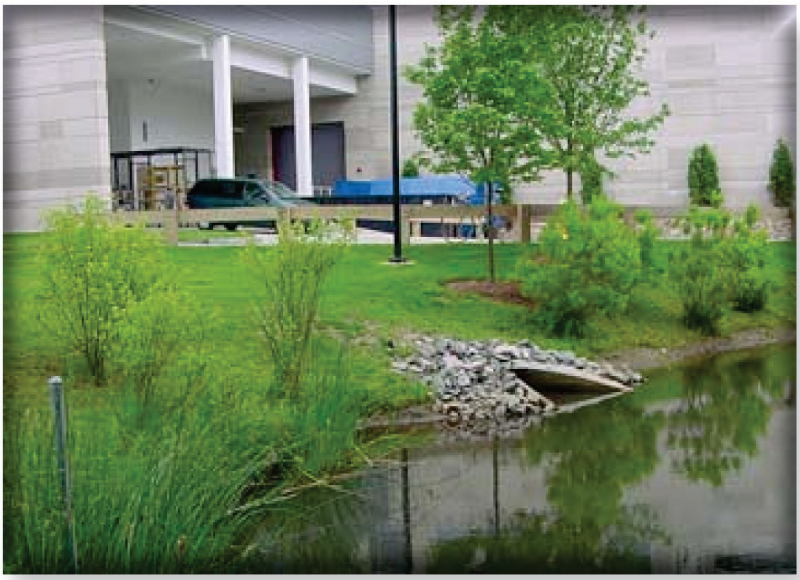
Sincerely yours,



Taylor Moylan, EIT

Paul A. Bergman, PE

Wet Basins (formerly wet retention ponds)



Description: Wet basins use a permanent pool of water as the primary mechanism to treat stormwater. The pool allows sediments to settle (including fine sediments) and removes soluble pollutants. Wet basins must have additional dry storage capacity to control peak discharge rates. Wet basins have a moderate to high capacity to remove most urban pollutants, depending on how large the volume of the permanent pool is in relation to the runoff from the surrounding watershed.

Ability to meet specific standards

Standard	Description
2 - Peak Flow	Can be designed to provide peak flow attenuation.
3 - Recharge	Provides no groundwater recharge.
4 - TSS Removal	80% TSS removal credit when combined with sediment forebay as pretreatment.
5 - Higher Pollutant Loading	May be used as treatment BMP provided basin bottom is lined and sealed. For some land uses with higher potential pollutant load, may require pretreatment by oil grit separator, sand filter or equivalent prior to discharge to wet basin
6 - Discharges near or to Critical Areas	Do not use for discharges to cold-water fisheries
7 - Redevelopment	Not usually suitable.

Advantages/Benefits:

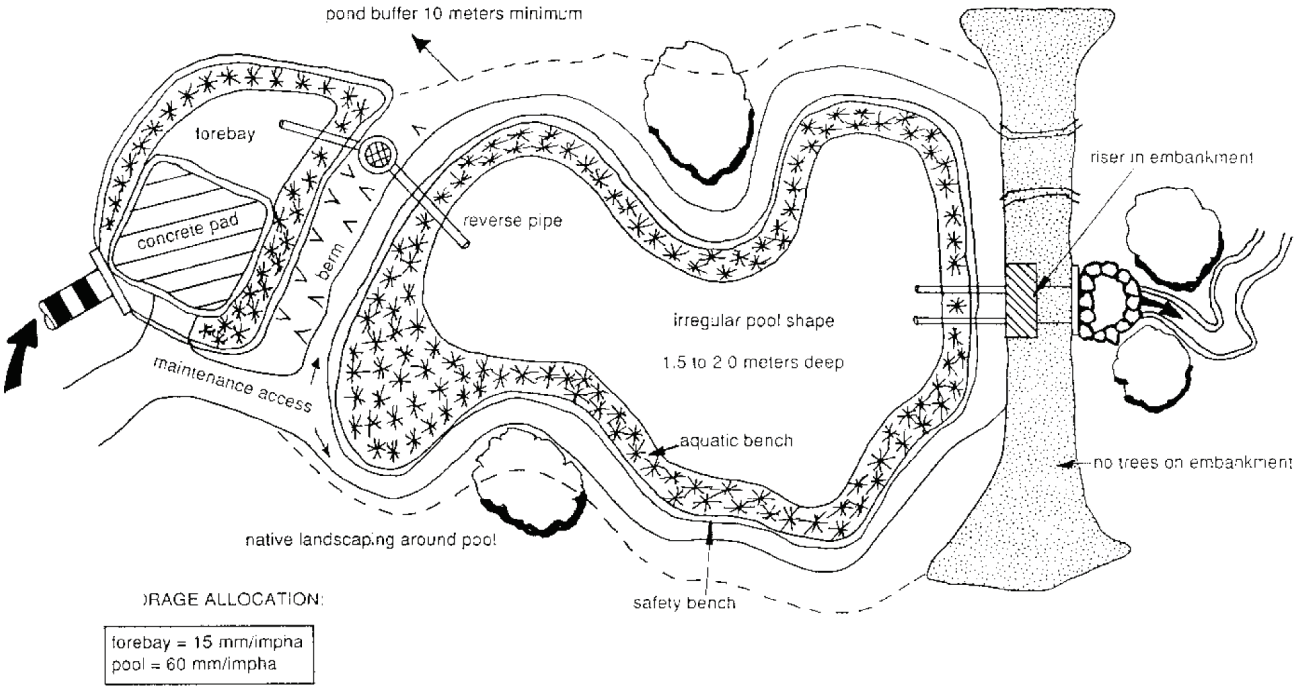
- Capable of removing both solid and soluble pollutants
- Capable of removing nutrients and metals
- Aesthetically pleasing BMP.
- Can increase adjacent property values when properly planned and sited.
- Sediment generally needs to be removed less frequently than for other BMPs.
- Can be used in retrofits

Disadvantages/Limitations:

- More costly than extended dry detention basins.
- Larger storage volumes for the permanent pool and flood control require more land area.
- Infiltration and groundwater recharge is minimal, so runoff volume control is negligible.
- Moderate to high maintenance requirements.
- Can be used to treat runoff from land uses with higher potential pollutant loads if bottom is lined and sealed.
- Invasive species control required

Pollutant Removal Efficiencies

• Total Suspended Solids (TSS)	80% with sediment forebay
• Total Nitrogen	10% to 50%
• Total Phosphorus	30% to 70%
• Metals (copper, lead, zinc, cadmium)	30% to 75%
• Pathogens (coliform, e coli)	40% to 90%



adapted from Schueler, 1992

Maintenance

Activity	Frequency
Inspect wet basins to ensure they are operating as designed	At least once a year.
Mow the upper-stage, side slopes, embankment and emergency spillway.	At least twice a year.
Check the sediment forebay for accumulated sediment, trash, and debris and remove it.	At least twice a year.
Remove sediment from the basin.	As necessary, and at least once every 10 years

Special Features

MassDEP requires a sediment forebay as pretreatment to a wet basin.

LID Alternative

1. Design measures to reduce impervious areas, shrinking the size of the wet basin
2. Use if LID site design credits for the water quality volume requirement (Stormwater Standard 4)
3. Decentralized Stormwater Management System that uses vegetative filter strips to direct stormwater runoff to BMPs located throughout the site

Wet Basins

A wet basin may be created by constructing an embankment or excavating a pit. The primary component of a wet basin is the deep, permanent pool, but other components, such as a shallow marsh, may be added to the design *(see basin/ wetland design in constructed wetlands section)*. MassDEP requires a sediment forebay as pretreatment to a wet basin. The sediment forebay plus the wet basin collectively are credited with an 80% TSS removal rate.

The basic operation of a wet basin allows incoming stormwater to displace the water present in the pool. This stormwater remains until displaced by runoff from another storm event. Increased retention time allows particulates, including fine sediments, to settle out of the water column. The permanent pool also serves to protect deposited sediments from resuspending during large storm events. Another advantage of wet basins is the biological activity of algae and fringe wetland vegetation, which reduces the concentration of soluble pollutants. Wet basins may be designed with a multi-stage outlet structure to control peak rate discharges from different design storms. When properly designed and maintained, wet basins can add recreation, open space, fire protection, wildlife habitat, and aesthetic values to a property.

Applicability

Generally, dry weather base flow and/or large contributing drainage areas are required to maintain pool elevations. The minimum contributing drainage area must be at least 20 acres, but not more than one square mile. Sites with less than 20 acres of contributing drainage area may be suitable only if sufficient groundwater flow is available. Use wet basins at residential, commercial and industrial sites. Because wet basins remove soluble pollutants, they are ideal for sites where nutrient loadings are expected to be high. In such instances, source controls must also be implemented to further reduce nutrient loadings.

Investigate soils, depth to bedrock, and depth to water table before designing a wet basin. At sites where bedrock is close to the surface, high excavation costs may make wet ponds infeasible. If the soils on site are relatively permeable or well drained, such as a soil type in Hydrologic Group A (as defined by the Natural Resource Conservation Service), it will be difficult to maintain a permanent pool. In this situation, it may be necessary to line the bottom of the wet pond to reduce infiltration. Designing wet basins for multiple storms will provide peak rate control. In such instances, design the upper stages of wet basins to provide temporary storage of larger storms (i.e., 10, 25, and 100-year 24-hr. storms). Wet basins are generally ineffective in controlling the post-development increase in runoff volume, although some infiltration does occur, as well as evaporation in summer months.

Planning Considerations

Evaluate soils and depth to bedrock before designing a wet basin. At sites where bedrock is close to the surface, high excavation costs may make wet basins infeasible. If the soils are permeable (A and B soils), heavy drawdown of the basin may occur during dry periods. In these situations, compact the basin soils or install a liner at the bottom of the basin to minimize the potential for drawdown. Specifications for basin materials include (in order of decreasing costs):

- 6-inch clay
- Polyvinyl liner
- Bentonite
- 6 inches of silt loam or finer material

To be effective in reducing peak runoff rates, locate the basin where it can intercept most of the runoff from the site, typically a low elevation that is near freshwater wetlands. Like all stormwater best management practices, wet basins must not be constructed in wetland resource areas other than isolated land subject to flooding, bordering land subject to flooding, land subject to coastal storm flowage, and riverfront area. Select a location that can accommodate the need to attenuate peak discharge rates without adversely impacting nearby wetland resources.

It is preferable to create the wet basin by excavating a pit below the grade of land. When this is not feasible, an earthern embankment can be created. Embankments or dams created to store more than 15 acre-feet, or that are more than 6 feet high, are under the jurisdiction of the Massachusetts Department of Conservation and Recreation (DCR) Office of Dam Safety and must be constructed, inspected, and maintained according to DCR guidelines.

Design

See the following for complete design references:
Wet Extended Detention Pond Design: Step by Step Design. 1995. Claytor.

Volume and geometry are the critical parameters in a wet basin design; the relationship of the volume in the permanent pool to the contributing runoff volume directly affects pollutant removal rates. Generally, bigger is better; however, after a certain threshold level, increasing the pool size results in only marginal increases in pollutant removal. The permanent pool must be sized at a minimum to hold twice the water quality volume (this is equivalent to a VB/VR of 2) when a wet basin is designed to provide peak rate attenuation in addition to water quality treatment. The peak rate volume is an additional volume above the permanent pool. The permanent pool volume must not be counted as part of the volume devoted to storage associated with peak rate attenuation. When designing a wet basin to also accommodate peak rate attenuation, a multiple stage outlet must be included as part of the design.

Make the minimum contributing drainage area at least 20 acres, but no more than one square mile. Sites with less than ten acres of contributing drainage area may be suitable if sufficient groundwater flow is available to maintain the permanent wet pool.

Pool depth is an important design factor, especially for sediment deposition. Use an average pool depth of 3 to 6 feet. Settling column studies and modeling analyses show that shallow basins remove more solids than deeper ones. However, resuspension of settled materials by wind action might be a problem in shallow basins that are less than two feet deep.

Depths greater than eight feet may cause thermal stratification. Stratified pools tend to become anoxic (low or no oxygen) more often than shallower ponds. If possible, vary depths throughout the basin.

Providing deeper pools can provide fish habitat. It may be advantageous to introduce fish to the wet basins to reduce mosquito breeding. When designing wet basins to support fish, a fisheries biologist should be consulted. Fish habitat features may include trees to provide shading over the deeper depths. Selection of trees should be done carefully to avoid embankment or sidewall failure.

Use intermittent benches around the perimeter of the basin for safety and to promote vegetation. Design the safety bench to be at least ten feet wide and above normal pool elevations. Make the aquatic bench at least ten feet wide and maintain depths of 12 to 18 inches at normal elevations to support aquatic vegetation. Shallow depths near the inlet will concentrate sediment deposition in a smaller, more accessible area. Deeper depths near the outlet will yield cooler bottom water discharges that may mitigate downstream thermal effects.

Use a minimum pool surface area of 0.25 acres. Enhance the performance of the wet basin by enlarging the surface area to increase volume, instead of deepening the pool, although this increases water temperatures and evaporation rates. The original design of wet basin depths and volumes should take into account the gradual accumulation of sediment. Accumulating sediment in the pool will decrease storage volume and reduce pollutant removal efficiency.

Wet Basin Design Criteria	
Factor	Criteria
Maximum Drainage area	≥20 acres unless sufficient groundwater flow
Permanent Pool Volume	≥2 x WQv (equivalent to Vb/Vr ratio of 2)
Minimum Pool Surface Area	≥0.25 acres
Minimum Length to Width Ratio	≥3:1
Mean Permanent Pool Depth	3 to 6 feet
Maximum Permanent Pool Depth	8 feet
Maximum Pool Slopes	≤3H:1V
Maximum Safety & Aquatic Bench Slopes	≤2H:1V
Perimeter Accessway Width	≥15 feet
Perimeter Vegetative Buffer	≥25 feet
Sediment Forebay	Required (not included in wet basin sizing)
Pool Drain (for maintenance purposes)	Required maximum pool drain time: 40 hours

MassDEP requires a sediment forebay to pretreat stormwater before it enters the wet basin. Forebays trap sediment before the runoff enters the primary pool, effectively enhancing removal rates and minimizing long-term operation and maintenance problems. Removing sediment from the forebay is easier and less costly than from the wet basin pool, so design sediment forebays for ease of

maintenance. Hard bottom forebays make sediment removal easier. Make forebays accessible by heavy machinery to faciltate maintenance.

To avoid reducing the pollutant removal capability and to maximize travel distance, locate the inflow points as far from the outlet structure as possible. To maximize stormwater contact and retention time in the pool, use a length to width ratio of at least 3:1.

Set the invert elevation of the inlet pipe at or below the surface of the permanent pool, preferably within one foot of the pool. Pipes discharging above the pool can erode the banks and side slopes. Design all inflow points with riprap or other energy dissipators to reduce inflow velocities.

Establish wetland vegetation on the aquatic bench to enhance the removal of soluble nutrients, facilitate sediment trapping, prevent sediment resuspension, provide wildlife and waterfowl habitat, and conceal trash and debris that may accumulate near the outlet. Six to eighteen inches of water depth are needed for wetland vegetation growth.

Make the slopes of the pools no steeper than 3:1. Flatter slopes help to prevent bank erosion during larger storms and facilitate routine bank maintenance tasks, such as mowing. Flat slopes also provide for public safety, and allow easier access. In addition, design the sides of the pool that extend below the safety and aquatic benches to the bottom of the pool at a slope that will remain stable, usually no steeper than 2:1 (horizontal to vertical).

Design the invert of the wet basin outlet pipe to convey stormwater from approximately one foot below the pool surface and to discharge into the riser in the pond embankment. To prevent clogging, install trash racks or hoods on the riser.

To facilitate access for maintenance, install the riser within the embankment. Place anti-seep collars or filter and drainage diaphragms on the outlet barrel to prevent seepage and pipe failure. Make the vital parts of the structure accessible to maintenance personnel during normal and emergency conditions. Install a bottom drainpipe to allow complete draining of the wet basin in case of emergencies or for routine maintenance.

Fit both the outlet pipe and the bottom drain pipe with adjustable valves at the outer end of the outlet to permit adjustment of the detention time, if necessary.

To prevent scour at the outlet, install a flow transition structure, such as a lined apron or plunge pad, to absorb the initial impact of the flow and reduce the velocity to a level that will not erode the receiving channel or area.

Design embankments and spillways to conform with DCR Dam Safety regulations, if applicable. All wet basins must have an emergency spillway capable of bypassing runoff from large storms without damaging the impounding structure.

Provide an access way for maintenance, with a minimum width of 15 feet and a maximum slope of 15%, by public or private right-of-way. Equipment that will be used for maintenance must be capable of using this access-way. This access should extend to the forebay, safety bench, and outflow structure and should never cross the emergency spillway, unless the spillway has been designed for that purpose. Place vegetative buffers around the perimeter of the wet basin to control erosion and remove additional sediment and nutrients. The vegetative buffer must be at least 33 feet (10 meters). Vegetation must be designed to prevent the introduction of invasive species.

Maintenance

Inspect wet basins at least once per year to ensure they are operating as designed. Inspect the outlet structure for evidence of clogging or excessive outflow releases. Potential problems to check include: subsidence, erosion, cracking or tree growth on the embankment, damage to the emergency spillway, sediment accumulation around the outlet, inadequacy of the inlet/outlet channel erosion control measures, changes in the condition of the pilot channel, erosion within the basin and banks, and the emergence of invasive species. Make any necessary repairs immediately. During inspections, note any changes to the wet basin or the contributing watershed area because these may affect basin performance. At least twice a year, mow the upper-stage, side slopes, embankment and emergency spillway. At this time, also check the sediment forebay for accumulated material, sediment, trash, and debris and remove it. Remove sediment from the basin as necessary, and at least once every 10 years. Providing an on on-site sediment disposal area will reduce the overall sediment removal costs.

References

Galli, J. 1990, Thermal Impacts Associated with Urbanization and Stormwater Best Management Practices. Prepared for the Maryland Department of Environment, Baltimore, MD, by the Metropolitan Council of Governments, Washington, D.C.